TAC Meeting – March 3, 2008
Announcements from the Chair

Welcome to the March meeting of the Wastewater Technical Advisory Committee.

I would also like to welcome and introduce Mr. Lee Ferrero who will fill the vacancy that we have on our Financial Committee. Lee is a resident of the proabition zone. He has his masters degree in Public Administration, and is President and CEO of the Private Industry Council of San Luis Obispo. His experience will be valuable to the TAC.

As a result of input from both members of the public and the TAC, we are changing the format of our meeting. The three committees will no longer formulate their comments on the TMs in advance of the meeting. Instead, after a short introduction, we will discuss in public the contents of the documents followed by public comment. In the week after our meeting the committees will meet and, based on tonight's discussion and input from the public, formulate their comments. The three documents along with written public comments will then be combined into the final TAC report and published on our web site.

On the table we have new speaker slips and have added a separate Technical Memo comment sheet. If you fill out a sheet you may either read your comment as part of public input or turn it in anytime during this meeting. We still encourage public members present who make oral comments to also submit their comments in writing.

If any member of the TAC has questions for the speaker or wishes to respond to a statement or question from the speaker, I will ask you to remain at the podium rather then waiting until the end of the public comment period.

As a part of the EIR process the Project Team is producing a series of Technical Memorandums covering a variety of subjects that need to be addressed in the EIR. I urge all people who might be interested to regularly visit the county's Los Osos Wastewater Project website or if you wish to be notified by email to sign-up by either sending us an email at lowwp@co.slo.ca.us or following the link on the website. We encourage you to send us comments in advance of our meeting and, if you can keep them to no more than 350 words, we will read them aloud prior to the public comment period on that TM.

In addition to the Technical Memo 'Flows and Loads' on this evenings agenda we will hear from the Environmental and Engineering Committees their observations on additional activities that they participated in this past month.

Before we begin our agenda items, I would like to ask Mark Hutchinson, lead engineer on the County EIR team, to fill us in on why we are conducting these meetings.

FROM MARK HUTCHINSON
3/3/08

Los Osos Technical Memorandums
Purpose and Objectives
March 3, 2008

Purpose:

The primary purpose of the technical memorandums being prepared for the Los Osos Wastewater Project is to support the development of the project's Environmental Impact Report (EIR). In any large project, the team members typically memorialize their communications through written correspondence, in order to ensure that all team members have input into and access to all of the details of the project. In most projects, the public is neither concerned with, nor involved in, the development of all of the details of a project that are necessary to prepare an EIR.

However, in Los Osos, the public has not only expressed a great deal of interest in the details of the project, but also clearly has much to offer in the way of background, questions, and insight. Early on in this latest effort to develop a wastewater project for Los Osos, the County recognized this level of community interest and involvement and determined to include the public in project development process. Bringing draft technical memorandums to the community, through the technical advisory committee, is intended to gain early public input into the EIR.

Objectives:

It is important to understand that the technical memorandums respond to EIR preparer's desire to gain a better understanding of all of the details that go into developing a project as complex as the Los Osos Wastewater Project. The technical memorandums answer some questions, and by their nature may give rise to additional questions. The technical memorandums are not the finished product on any aspect of the project; rather, they are a method used to both communicate within the team, and with interested members of the public as the project moves through the EIR phase. The technical memorandums provide a format and framework through which the project team and the community can organize their thoughts, comments, and concerns, in order to ensure that we fully address community environmental issues.

Draft + comments + responses = Technical Memorandum

TM - Flows & Loads (February 2008)

p 10: population 18,428 = 18.43 (thousand)

p 1,2 peaking factor (PF)

PF = 1.8 (gravity) ← ?

PF = 1.4 (step) ← ?

PF = 1.6 (low pressure)

References

1. 'Sewerage & Sewage Treatment', H.E. Babbitt, 7th ed., J. Wiley, 1957 (p. 34)
2. 'Water Quality', G. Tchobanoglous, E.D. Schroeder, Addison Wesley, 1985 (p 27)
3. 'Water & Wastewater Technology', M.J. Hammer & M.J. Hammer, 5th ed., Pearson-Prentice, 2004, (p 360)

#2) $PF = 5p^{-0.16} = 3.14$ ($p = 18.43$)

#1) $PF = 5p^{-0.2} = 2.79$ ←

or $PF = \left(1 + \frac{14}{4+\sqrt{p}}\right) = 2.69$

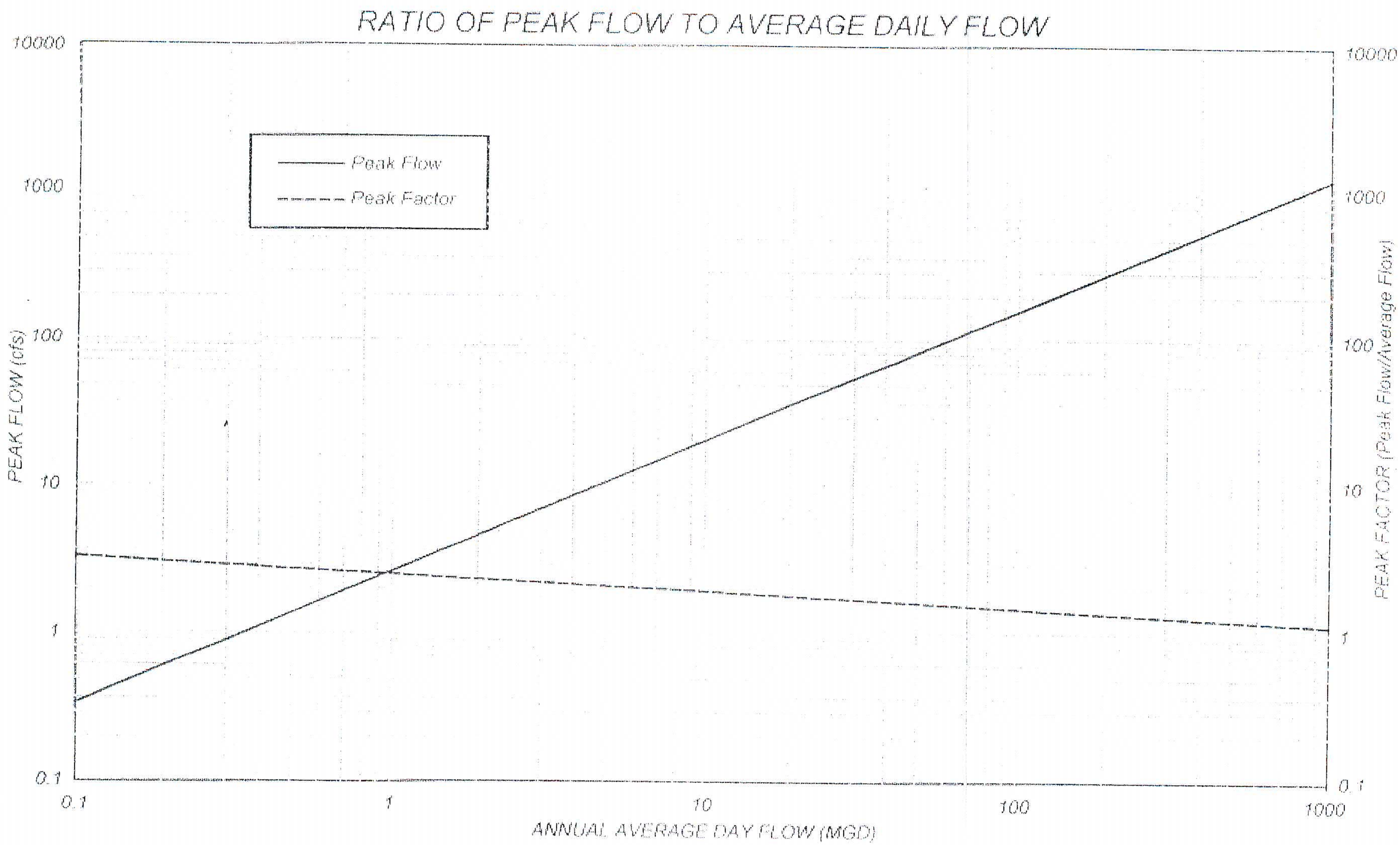
#3) $PF \doteq 2.5$ (low populations)

Avg = 2.78 ⇒ $PF \doteq 2.8$ (Los Osos, gravity)

$\frac{1.8}{2.8} = 0.64$ ← → TM-PF = 60-65% of Ref. Values ?

Also - basis for STEP PF ?

P:\WORKING\VDB490-WASC\Water Agencies Design Guide (WADG)\Dwgs\ACAD 2000\4.2_Figure4-2-1-2000.dwg 8/18/2004 3:04:45 PM PST



WATER AGENCIES' DESIGN GUIDELINES

SEWER PLANNING

RATIO OF PEAK FLOW
TO AVERAGE DAILY FLOW
FIGURE 4-2-1

Observations of the TAC Environmental Working Group meeting with Todd Ecological

By: Dan Berman, David Dubbink and Maria Kelly of the TAC Environmental Working Group - Submitted March 3, 2008

Introduction

On February 7th, we were offered the opportunity to participate in a presentation prepared by Johnathan Todd of Todd Ecological of Massachusetts. In addition to the members of the committee, the chair of the committee, Bill Garfinkel and a few members of the community from Morro Bay were also in attendance.

During the presentation and overview of the treatment system that this company provides, we had the opportunity to ask questions and participated in a round table discussion about his treatment procedures as they could be utilized in regards to the Los Osos Waste Water Project. Some of our specific questions and Todd's responses are listed below.

Questions and Responses

Question: What is the footprint required for Los Osos in regards to treatment with a decentralized or conventional collection system?
Response: In a decentralized situation, unknown due to the variables regarding potential locations and inflow due to the number of homes hooked into that particular "plant". With a conventional system, a minimum of 3 acres would be needed for a "pond". (we did not discuss winter storage)

Question: What was the life cycle of the plant life in the "beds" and how many operators were required to monitor the system?
Response: It could be possible that the plants would only need to be changed 1x per year. The number of employees required to monitor is unknown due to the fact that it would depend on what type of collection system was utilized.

Question: Does the bacteria do a good job at regulating itself or does it need to be fed?
Response: Depending on the fluctuation of people utilizing the system, it would be self-maintaining but with a large increase due to seasonal tourism, the maintenance would require the addition of bacteria.

Questions: How often would the treatment system within the greenhouse need to be drained and changed?
Response: Unknown. It would depend on the plants, the snails and their ability to "screen" out the sludge should there be any. The sludge in the pond would need to be cleaned every 5 years.

Question: What is the largest capacity plant you have built to be utilized for domestic use?
Response: 80,000 gal/per day

Question: Is the Eco-machine concept tied to a specific collection system (STEP,Gravity)?
Response: No

Summary

This was our committee's second opportunity to informally discuss the wastewater management challenges with other concerned members of the environmental community. During the conversation it became clear that Mr.Todd had not reviewed the recent water studies that have been prepared by Cleath and Associates as well as the Salt Water Intrusion report that was completed for the CSD in 2005. He was interested in the paper by Cleath and we suggested that he obtain a copy in the event he chooses future participation.

The Eco-machine is an interesting concept and the idea of building treatment works that resemble greenhouses could lessen neighbor's concerns. Todd Ecological isn't a large company and many of their projects have been structured as demonstrations, their specializations being wastewater treatment. Handling the entire LO project would be beyond the capabilities of his company. We suggested that if he wished to pursue working on the project he might want to approach and partner with another engineering firm for collaboration. In addition, we agreed that due to the creativeness surrounding some of the possibilities that were discussed, some doors could potentially open for grants that recognize and support innovative solutions and design. It was pointed out that the RFQ and RFP process would be the best way to introduce to the county what his company had to offer. We also agreed that the continued delay had almost created an "emergency" type of situation in regards to the impact on the estuary. We also pointed out that neither the RWQCB nor the county was likely to allow a "phase" type of approach.

The Environmental working group of the TAC appreciated that the process allowed for this type of solution to be introduced and objectively evaluated by the community.

MEMORANDUM

To: Bill Garfinkel, Chairman
Los Osos Wastewater Project Technical Advisory Committee

From: John Brady, Member of TAC Engineering Subcommittee

Subject: Field Trip to Woodlands Development, Observations of a Wastewater Plant

Date: March 1, 2008

On February 23, 2008, the Chairman and the Engineering Subcommittee of the Los Osos Wastewater Technical Advisory Committee toured Woodland Development's wastewater treatment plant in Nipomo California. The tour was guided by the lead wastewater operator for the plant. Those who were present during the tour included:

- Bill Garfinkel, Chairman of TAC
- John Brady, Engineering Subcommittee
- John Fouche, Engineering Subcommittee
- Bob Semonsen, Engineering Subcommittee
- Jason Meeks, Plant Operator and employee of Fluids Resource Management Inc.

Design Firm and Plant Operator

The plant was designed by the Wallace Group, a San Luis Obispo based planning and engineering firm. The plant is operated by Fluids Resource Management Inc, which is a San Luis Obispo based firm providing operations, maintenance and construction services to the potable water and wastewater industries. This firm also operates the potable water system for the Woodland Development.

Woodlands Development

The Woodlands Development is located on the southwest portion of the Nipomo Mesa and covers an area of approximately 900 acres. The topography of the development is generally sloping downward to the southwest, with the exception of one centrally located hill. The hill is approximately 300 feet above mean sea level (amsl) and the elevation of the northeastern part of the Woodlands Development is approximately 250 feet amsl. The lowest ground elevation is approximately 125 feet amsl, near the wastewater plant.

The development includes a mix of single family and multi-family residential homes that surround a golf course. Limited commercial/industrial development is also planned and will be located near the wastewater plant. Currently, 150 to 200 single family homes are occupied. Ultimately, the development will have approximately 1300 homes. An aerial photograph of the Woodland Development in Nipomo California in presented below in Figure 1:

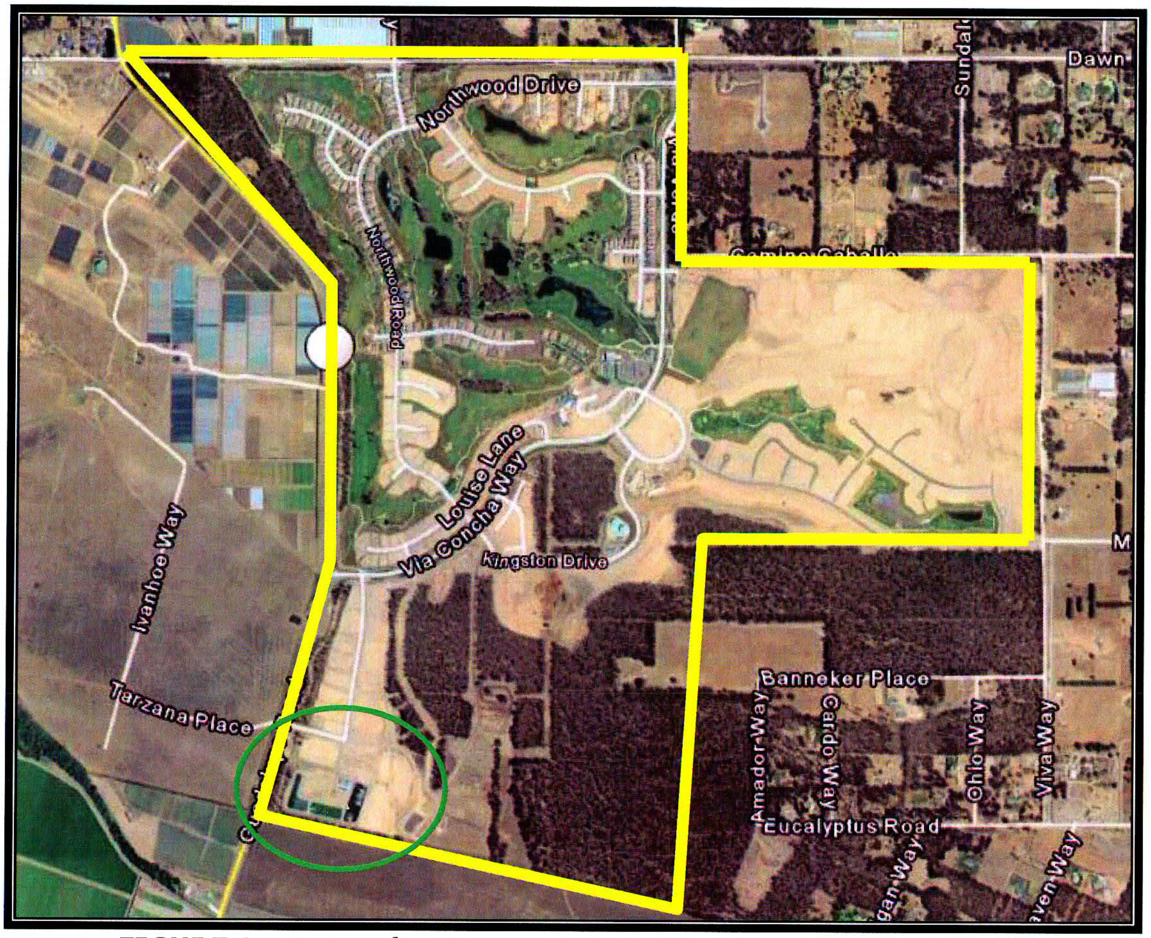


FIGURE 1 – Approximate Boundary of Woodland Development

Wastewater Plant

The wastewater plant is located at the southwest corner of the development, which is the area of the development with the lowest ground elevation. The plant site is square in shape and occupies approximately 8 acres of land, which is surrounded by a chain link fence. In the center of the plant, there is an undeveloped area approximately 2.5 acres in size that is reserved for plant expansion. Eucalyptus trees bound the plant site on the south and west boundary, which screens the plant from highway 1. An aerial photograph of the wastewater plant is presented below in Figure 2:

FIGURE 2: Woodlands Development Wastewater Plant

The plant is designed to treat 0.7 million gallons per day (MGD) and designed to handle a peak flow of 0.84 MGD. The treatment system employed at the plant is an advanced wastewater ponding system, coupled with microfiltration and chlorine disinfection. The wastewater is collected through a gravity collection system, using only one lift station located at the northwest corner of the development. The plant effluent is pumped to one of the golf course's lakes, which is also filled from local groundwater wells. The lakes, in turn, are used as the source for irrigation water for the golf course.

In terms of staffing requirements, the Woodland Development's wastewater plant is operated by a private contract service, Fluid Resource Management Inc. The operator indicated that there are 1.5 staff positions supporting the wastewater operation and at full design flows, they anticipate needing 2 staff positions. Also, Fluid Resource Management uses a roaming crew for quarterly maintenance. This crew rotates through the various plants that are operated by Fluid Resource Management and perform quarterly maintenance work at each site.

The specific plant components that were observed during our tour are described below:

Collection System

All wastewater is collected through a gravity system, taking advantage of topography of the development. However, due to the centrally located hill within the development, the northern portion of the collection system must drain to the northwest corner of the development to a lift station. This station pumps the wastewater to an area of the collection system where the wastewater can again flow by gravity towards the plant.

Manhole covers appeared to be located approximately every 200 feet and were positioned off-the-centerline but within the roadway. The lead wastewater operator indicated that some of the gravity collection system pipelines were installed as deep as 20 feet. The operator also indicated that the entire collection system was installed in sand.

The lift station was located directly in front of one of the golf course's restrooms. The station consisted of a concrete chamber, with the square top of the chamber being slightly higher than ground surface (approximately curb height or 6 inches) and measuring about 15 feet by 15 feet. A manhole cover measuring approximately 5 feet in diameter covered the access to the pumping chamber. The interior of the pumping chamber was cylindrical, measuring approximately 15 feet in diameter and was lined with an epoxy coating. The depth of the chamber appeared to be approximately 25 feet deep, perhaps more.

During the tour, the manhole cover was removed so that the interior of the pumping chamber could be observed. Wastewater could be observed inside the chamber with additional wastewater flowing into the chamber. No one in the group was able to detect odor emanating from the lift station. However, there was a breeze developing at the time of the observations.

Wastewater flows by gravity into the chamber and the lift pump appears to be controlled through a float activated mechanism. When the fluid level reaches a set point, the pump activates. The pump was activated at the time of the tour and the noise level with the manhole cover open was that of a low level conversation. The pump is designed to pump wastewater vertically 100 feet and horizontally at least 5000 feet.

The pump is electrically powered and is also equipped with a back-up electrical generator. The back-up generator is located near the lift station within a concrete block enclosure, measuring approximately 15 feet by 20 feet, with the fence being approximately 6 feet high.

Head-Works

As wastewater enters the plant, it enters a head-works chamber. The head-works is below ground and has a square concrete top at ground surface measuring approximately 25 foot by 30 foot. The chamber has several components to it.

The first element is a macerator or grinder. Wastewater flows into the head-works chamber and through the macerator. Immediately downstream of the macerator, the wastewater flows over an auger lift. The shaft of the auger is positioned at an angle of approximately 45 degrees and as it rotates, it lifts solids from the wastewater channel and delivers it to a trash bin. The length of the auger appears to be designed to allow time for fluids to drain from the solids being removed. The channel that includes the macerator and auger lift is approximately 15 feet long and 2 feet wide.

Parallel to the macerator/auger lift channel is a by-pass channel, which has the same width and length. Wastewater can be redirected to the by-pass channel through the use of channel gates. The by-pass channel also has a bar screen.

The group did notice a septic odor at the head-works when standing immediately over the grates and wastewater channels beneath. The odor did dissipate within a short distance. However, the macerator was not in operation at the time of our tour.

Once wastewater passes through either the macerator/auger lift channel or by-pass channel, it flows through a parshall flume, which is an open channel flowmeter. This meter constricts flow through a channel with a width of 6 inches wide, following very specific geometry specifications. The flow rate is determined by the fluid level in the channel's "throat" (narrowest width). In the flume at the plant, a sounding chamber is fluidly connected to the parshall flume throat. An ultrasonic sounding meter is used to measure the fluid level in the sounding chamber, which is converted to flow by the PLC.

Once the wastewater flows through the parshall flow meter, it enters a diverter chamber. The chamber is operated with channel gates and diverts the wastewater to any selected pond. This diverter chamber also receives the backwash water from the "Pall Filter".

Advanced Ponding System

Currently, the wastewater is treated by a series of three ponds. From the diverter chamber, the wastewater flows through a pipe and is discharged into the bottom of the first pond. The ponds are operated so that the bottom portion of the pond, near the inlet pipe, is anoxic and the top part of the pond is aerobic. The design hydraulic detention time is 20 to 30 days.

The ponds are rectangular in shape, measuring approximately 135 feet wide and 400 feet long and 15 feet deep. They are lined with high density polyethylene (HDPE) liners. All of the seams are double welded and all pipe penetrations appeared to be HDPE extrusion welded. In addition, each pond has a concrete skimmer section. The skimmer section consists of a curb just below the water surface (approximately 70 feet long in the first pond and 35 feet long in the second pond). The sections are positioned in one corner of the pond so that any floating materials will eventually get trapped in the skimmer section. Operators then manually remove any floating materials with pool nets and dispose.

The anoxic and aerobic zones of the ponds are maintained by three paddle wheel aerators that operate at the water surface. Two paddle wheel aerators are located in the center the pond and one is located at the far end of the pond. The operation of the paddle wheel aerators is controlled by a dissolved oxygen sensor that is position 2 feet below water surface at the pond inlet side. When the dissolved oxygen level falls below a selected level, the paddle wheel aerators turn on. The arrangement of the paddle wheel aerator is situated in a way to promote a surface current, which keeps the top portion of the wastewater aerobic. No paddle wheel aerators are located near the inlet side to ensure that the bottom portion of the inlet side of the pond remains anoxic for solids digestion.

The outlet side of the pond has a stand-pipe outlet pipe. When water reaches a certain level, it can flow into the top of the outlet standpipe and flow into the next pond, which is identical to the first pond. All flow is gravity from pond to pond, as each pond is at a lower level than the upstream pond. The operator indicated that in the future two additional ponds, identical with the first two ponds at the plant, will be installed to accommodate flows from future growth. All of these ponds will drain to the last pond currently in the plant.

The last pond is an "L" shaped pond, with one leg being approximately 110 feet by 200 feet and the other leg being approximately 60 feet by 110 feet. There is only one paddle wheel aerator in this pond. The outlet side of this pond is equipped with a pumping station, designed to pump the water 10 feet vertically and 500 feet horizontally to the feed tank of the Pall filter.

No odor was noticed by the group during the tour of all three ponds. All of the paddle wheel aerators were in operation at the time of the tour. Also, the operator indicated that no sludge is produced from the ponds. However, he did indicate that sand does blow into the ponds, which will ultimately need to be removed, and the system has not been in operation for an extended period of time.

Pall Filter

The Pall Filter is a highly permeable hollow fiber membrane filter, which is classified as microfiltration. The filter has several components to it and includes a feed tank, pumps to discharge water from the feed tank, pneumatically controlled valves, air compressor, sodium hypochlorite storage tank and dose pumping station, filter elements, acid and caustic storage and dosing pumps.

As water is pumped from the ponds, it is discharged to the Pall Filter feed tanks. When actuated, the pall filter system will pump water from the feed tanks to a header piping. The discharge pumps must provide the required pressure to pass the required flow through the filter element array. The specifications for Pall Filters indicate that the maximum pressure allowed through an element is 45 psi.

As water passes through the header piping system, chlorine is dosed into the wastewater to maintain a low chlorine concentration through the filter. This prevents bio-fouling of the membrane. The filtering elements are mounted between an inlet header system and an outlet header piping system, in a parallel flow arrangement. The Pall filter in place appears to be designed to handle much large flows, as there were additional inlet and outlet header piping systems with provisions to attach more filtering elements. The outlet header piping discharges to the chlorine contact basin for disinfection.

In order to control fouling of the membranes from inorganic precipitation, the Pall filter requires an acid soak and wash. The frequency of the acid washing is controlled by either hours of operation or head loss. A caustic wash is also used as part of the backwash process to control pH in backwash water and effluent. All backwash water is discharged into the first pond for treatment. Also, on a weekly basis, the filters are tested for integrity through a pressure test. This test is designed to identify compromised membrane elements. It is anticipated that the filter elements will have a life span of approximately 8 years, perhaps longer.

The ancillary equipment needed for the Pall Filter includes an air compressor and back-up electrical generator. The air compressor provides the motive force needed to actuate the various valves in the Pall Filter System. The generator will provide back up power for the feed tank discharge pumps, hypochlorite dosing pumps and air compressor.

The lead operator indicated that nitrates in the plant's effluent are non-detectable, turbidity is less than 1 NTU, Biochemical Oxygen Demand (BOD) is very low to non-detect. However, Total Dissolved Solids remained essentially unchanged through the treatment system. Contact with Rob Miller of the Wallace group indicates that the effluent quality is expected to have BOD and Suspended Solids less than 10 mg/l and turbidity less than 1 NTU. The low nitrates are likely due to the very long hydraulic detention times that are currently in the pond now and not due to the microfiltration process. Mr Miller indicated that nitrates are not an important consideration in this operation because all of the plant's effluent is used for irrigation, after significant dilution in the golf course lakes.

Chlorine Contact Basin

The operator indicated that a chlorine residual of 5.0 mg/l is established in the filtered effluent and then discharged into the chlorine contact basin. This basin consists of a rectangular concrete basin measuring approximately 30 feet by 100 feet. A channel approximately 6 feet wide runs circuitously through the basin to allow a long hydraulic retention time. The product of the outlet chlorine residual and hydraulic retention time is specified in the discharge permit to achieve a desired level of disinfection. A chlorine analyzer is located at the outlet of the chlorine contact basin.

Once the filtered effluent reaches the end of the chlorine contact basin, it is pumped to one of the lakes in the golf course. The effluent is pumped vertically approximately 65 feet and horizontally over 5,100 feet (close to 1 mile).

The operator indicated that no de-chlorination is required for the treated effluent, since the volume is extremely small in comparison to the volume of groundwater that is continuously pumped into the lakes. Treated effluent consists of less than

5% of total flow into the lakes. All of the plants effluent is sent to the lakes for disposal. The Lakes, in turn, are used as the source for irrigation water for the golf course. However, there are plans to possibly provide treated effluent to the commercial/industrial buildings planned to be constructed near the plant.

Plant Building

The plant has one building onsite. This building has two parts to it: an approximately 35 feet wide by 60 feet long portion and a 40 feet wide by 50 feet long portion. The 35 by 60 part of the building housed both the potable water and wastewater Supervisory Control And Data Acquisition (SCADA) systems and laboratory. The operator leading the tour showed the group the computer controls of the wastewater system as well as for the potable water system. The 40 by 50 section housed the Pall Filter and ancillary systems.

Important Observations

There are some important observations when considering the performance of this system and they are:

- The system is currently only serving 150 to 200 homes. This translates to a very high hydraulic detention time within the ponding systems. It is too soon to determine sludge production and sand removal requirements. Also, the current effluent quality being produced may not be the same when the design hydraulic detention time is ultimately reached.
- Due to the phasing of construction of the development, as well as the real estate market the population is changing through time. Consequently, estimation of per capita wastewater production will be difficult.
- Due to the partially constructed collection system and changing service population, it will be difficult to determine infiltration and inflow quantities.
- The claim of no biosolids production is noteworthy, although it may be too soon to tell since this plant has not been in operation for an extended amount of time. The issue of sand accumulation is also another important consideration for ponding systems.

Thank You

The Engineering Subcommittee appreciates both Jason Meeks of Fluid Resource Management Inc (who is also the lead operator for Plant) and Mr. Bill Garfinkel for coordinating this tour. We greatly appreciated the opportunity to observe in the field the various systems that are being considered in the Los Osos Wastewater Project.